# Determination of sulfur in fuel oil

Seat №.: **AQF_PE_002E** Category： Oil

Instruments: **AQF-100**

Method： Combustion-ion chromatography

Related standard

Concentrations of fluorine, chlorine, bromine, iodine, and sulfur can be determined and accurately by using a combustion ion chromatography (CIC) system combining an Automatic Quick Furnace Model AQF-100 which safely combusts samples with an ion chromatograph.

| | |
|---|---|
| Sample name | Fuel oil (Regular gasoline) |
| Sample status | |
| Measuring items | Sulfur (S) |
| Measurement principle | Sample is thermally decomposed in argon (Ar) atmosphere, then combusted in oxygen ($O_2$) atmosphere. Halogens in the sample are converted to hydrogen halide and halogen gas and sulfur turns into sulfur oxide. These components are collected into absorbing solution and converted to halide ion and sulfate ion. The resulting solution is analyzed by injecting into an ion chromatograph (IC).<br>**Analyzing flow**<br>[Sample weighing] ⇒ [Combustion] ⇒ [Collection of combustion gas] ⇒ [IC analysis] |
| Parameters | **1. AQF-100**<br>Sample size : 50ul<br>Sample boat : Quartz sample boat, TX2SBT<br>Additive : Not used<br>Pyrolysis tube : Quartz tube filled with quartz wool<br>Absorbent : Hydrogen peroxide / water, 30ppm<br><br>Heater Temp. Inlet : 800degC<br>Outlet : 1000degC<br>Gas flow Ar : 200 ml/min<br>$O_2$ : 400 ml/min<br><br>GA-100 Absorbent volume : 5 ml<br>Sampling loop : 100 µl<br>Absorption tube : For 10 ml<br>Water supply : 1<br>Ar flow for water supply : 150 ml/min<br><br>ABC-100 |

| | | 1st | 2nd | 3rd | 4th | 5th | End | Cool |
|---|---|---|---|---|---|---|---|---|
| Position | (mm) | 95 | 110 | 180 | | | | |
| Time | (sec) | 120 | 30 | 0 | | | 60 | 30 |
| Speed | (mm/sec) | | | | | | | |

Ar Time 0 (sec) $O_2$ Time 600(sec)

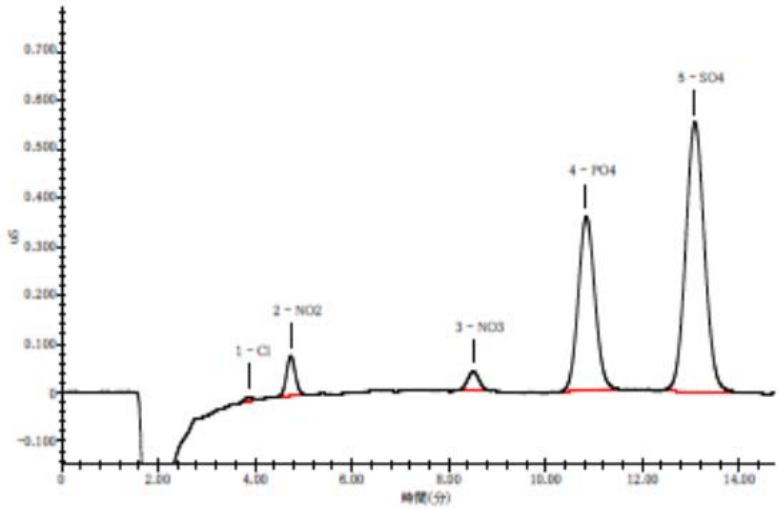
## 2.Ion chromatograph

| | |
|---|---|
| Ion chromatograph | : DIONEX DX-120 |
| Column | : DIONEX Ion Pack AG12A / Ion Pack AS12A |
| Eluent | : 2.7mM $Na_2CO_3$ / 0.3mM $NaHCO_3$ |
| Eluent flow | : 1.50ml / min |
| Detector | : Conductivity |
| Suppressor | : |
| Measuring time | : 15min |
| Sampling loop | : 100 µl using GA-100 sampling loop |
| Calibration | : F Cl Br S : 0.1ppm to 5.0ppm |

Results

## Chromatogram

**Regular gasoline**




## Results

The measurement values coincided with the results obtained by other methods. Chloride and sulfur at ppm level can be analyzed simultaneously.

| Sample | Results (ppm) | Average(ppm) | TS-100 (ppm) |
|---|---|---|---|
| Kerosene | 53.8, 54.8 | 54.3 | 54.2 |
| Regular Gasoline | 47.6, 45.3 | 46.5 | 46.2 |
| High-octane Gasoline | 7.05, 7.55 | 7.3 | 7.4 |

TS-100:Sulfur Analyzer based on UV-FL Method

Remarks

- Handling of reagents: Confirm labels and safety data sheets of reagents and handle them with enough care.